CLAIMS:

1. A magnetic resonance imaging system (1) comprising
   - an acquisition module (2) for acquiring first magnetic resonance signals for a central portion of k-space using a first resonance frequency and for acquiring second magnetic resonance signals for a peripheral portion of k-space using a second resonance frequency,
   - a data module (3) for combining first k-space data corresponding to the first magnetic resonance signals and second k-space data corresponding to the second magnetic resonance signals to form a full k-space and
   - an image module (3) for generating an image by transformation of k-space to image space.

2. The system as claimed in claims 1, wherein the data module (3) for combining first and second k-space data are adapted to substitute the first k-space data for part of the second k-space data to form a full k-space.

3. The system as claimed in claim 1, wherein the data module (3) for combining first and second k-space data are adapted to add the first k-space data to the second k-space data to form a full k-space.

4. The system as claimed in claim 1, wherein the acquisition module (2) for acquiring first magnetic resonance signals are adapted to acquire signals from protons.

5. The system as claimed in claim 4, wherein the acquisition module (2) for acquiring first magnetic resonance signals are adapted to acquire signals from protons in another substance than H_2O.

6. The system as claimed in claim 1, wherein the acquisition module (2) for acquiring first magnetic resonance signals are adapted to acquire signals from non-proton nuclei.

7. The system as claimed in claim 6, wherein the acquisition module (2) for acquiring first magnetic resonance signals are adapted to acquire signals from hyperpolarized non-proton nuclei.

8. The system as claimed in claim 1, wherein the acquisition module (2) for acquiring first magnetic resonance signals are adapted to acquire signals from electron spins.

9. The system as claimed in claim 1, wherein the acquisition module (2) for acquiring second magnetic resonance signals are adapted to acquire signals from protons.

10. The system as claimed in claim 9, wherein the acquisition module (2) for acquiring second magnetic resonance signals are adapted to acquire signals from protons in H_2O.

11. A magnetic resonance imaging method, the method comprising the steps of

- acquiring (9) first magnetic resonance signals for a central portion of k-space using a first resonance frequency,
- acquiring (10) second magnetic resonance signals for a peripheral portion of k-space using a second resonance frequency,
- combining (12) first k-space data (16, 19, 23) corresponding to the first magnetic resonance signals and second k-space data (15, 18, 22) corresponding to the second magnetic resonance signals to form a full k-space (17, 21, 24) and
- generating (13) an image by transformation of k-space to image space.

12. A computer program comprising

- computer instructions to acquire first magnetic resonance signals for a central portion of k-space using a first resonance frequency,
- computer instructions to acquire second magnetic resonance signals for a peripheral portion of k-space using a second resonance frequency,
- computer instructions to combine first k-space data (17, 19, 23) corresponding to the first magnetic resonance signals and second k-space data (15, 18, 22) corresponding to the second magnetic resonance signals to form a full k-space (17, 21, 24) and

- computer instructions to generate an image by transformation of k-space to image space,

when the computer program is executed in a computer.